Climate variability and water availability in Ouagadougou's informal settlements

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What is the issue?

In 2006, the government of Burkina Faso demonstrated its commitment to improving access to potable water through the National Program for Potable Water Supply and Sanitation. One of the program's objectives was to provide 4 million people with access to potable water, bringing the level of access from 60% in 2005 to 80% in 2015. The program's monitoring and evaluation manual called on the *Office National de l'Eau et d'Assainissement* (ONEA) and the *Direction Générale des Ressources en Eau* (DGRE) to implement the program. The ONEA was responsible for public access to water in subdivided urban areas, while the DGRE covered rural areas.

Unfortunately, the program excluded the informal settlements of Ouagadougou, which fall somewhere between being urban and rural. Access to potable water in these settlements remains a significant challenge and is worsening under a changing climate. The lack of clean water affects the health and living conditions of the 300,000 people living in the settlements. The IDRC-funded project *Climate variability and access to and utilization of water resources in the informal settlements in Ouagadougou, Burkina Faso* assessed water quality in these settlements to inform appropriate adaptation measures at the community and governmental levels.

Key messages

- **More than 300,000 people live in the informal settlements of Ouagadougou, where it is difficult to access potable water.**
- **15-40% of water sources in these settlements are contaminated with nitrates, and 40-80% of household domestic water reserves are polluted with coliform bacteria and other micro-organisms.**
- **33% of households have a child under the age of 10 suffering from diarrheal illness caused by polluted water.**
- **Associations, NGOs, and local authorities need to educate households, especially women, on how to practice proper hygiene when collecting, transporting, storing, and using water for consumption.**
- **The *Office National de l'Eau et d'Assainissement* should encourage private operators of water sources in outlying settlements to respect hygiene rules as described in agreements.**

What did we do?

Researchers assessed water quality at three sites (Nioko II, Poleso, and Nonghin) and for three types of sources (boreholes, wells, and standpipes), by taking monthly samples between April 2012 and March 2013 from 15 different sources. Samples were tested for both chemical and microbial pollution.

Researchers also surveyed a random sample of 1500 households every three months to gather data on water collection and storage conditions,

and on episodes of diarrheal illness in children. In addition, water from 60 of these households was tested every three months for two years for levels of microbial contamination. Together, these tests determined the level and seasonal variation of microbial contamination in the water at the community source and in the home.

What did we learn?

A significant proportion of water sources are polluted

Tests showed abnormal nitrate concentrations (above 25 mg/L) in 15-40% of water sources across all three study sites, depending on the month. High nitrate concentrations in drinking water are problematic because they can lead to methemoglobinemia, a condition that weakens the ability of blood hemoglobin to carry oxygen from the lungs to the rest of the body. Methemoglobinemia can quickly lead to death by asphyxiation in infants.

Potable water should be germ-free, but between 20-50% of water sources are contaminated by coliforms. Results of the study suggest that there are no clear seasonal trends to microbial pollution.

Household water reserves are highly polluted

Between 40-80% of households consume coliform-polluted water. Unlike microbial pollution at water sources, pollution in household water reserves (i.e. storage containers) follows a clear seasonal pattern, with higher pollution levels during the rainy season.

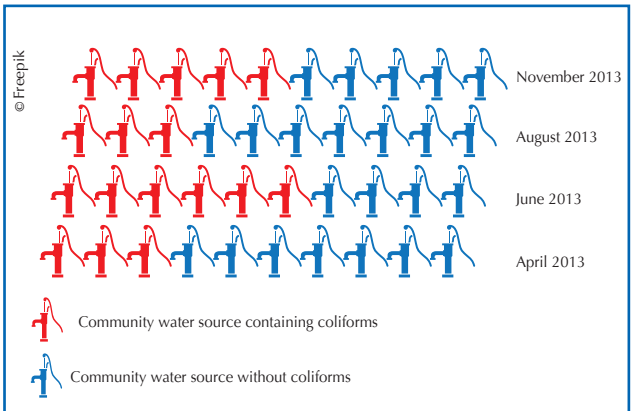

Figure 1: Level of microbial pollution at different water sources by month

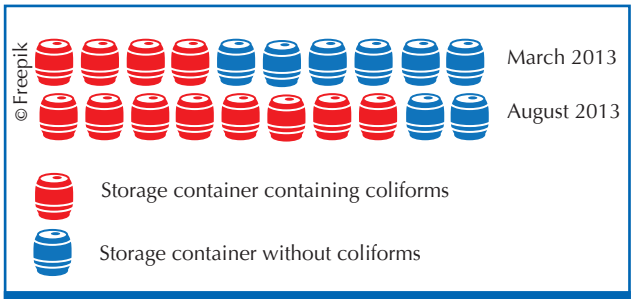

Figure 2: Level of microbial pollution in water storage containers by month

Diarrheal illness in children is frequently caused by water pollution

Microbial water pollution affects public health, as evidenced by frequent diarrheal illness in children without access to clean water. For example, in August 2012, approximately 1 in 3 households reported that children living in the household had experienced an episode of diarrhea. The risk is 15% higher in households that use borehole water than for those that use water purchased at a standpipe. The increased risk of microbial pollution in boreholes is due to a lack of chlorination, as well as the time and travel required to retrieve the water. Water from standpipes contains residual chlorine from treatment, which helps maintain quality after the water is collected and while it is handled and stored.

Stories of change

Community perceptions can often limit the positive effects of policies regulating water sources. Here follows the story of one community where a good policy was met with resistance.

With the intent of improving public health for children, a councillor in Nioko II proposed to the area leader that a bylaw be passed to close a borehole drilled in the 1980s, where there was severe nitrate pollution (over 110 mg/L). The councillor solicited support from others in the community to increase the legitimacy of his proposal with the area leader. However, many people preferred the taste of the water from the contaminated borehole and believed that closing it would reduce the community's access to water. The councillor suggested a public education campaign to convince those who opposed closure of the borehole, but the area leader was also opposed.

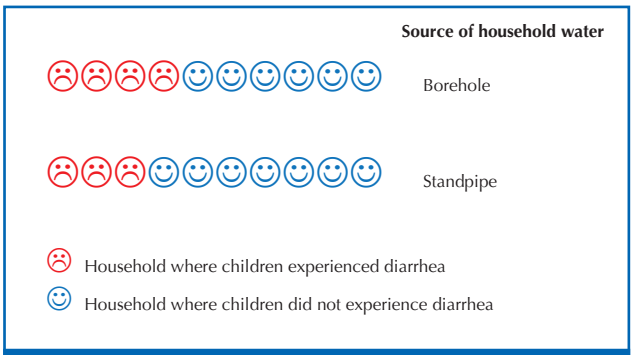

Figure 3: Incidence of diarrhea in children based on household water source

Faced with this situation, the *Association Natilgué* (a partner in the project) and the local councillor led a campaign to educate the population about limiting use of water from this borehole to activities other than consumption. While education is still underway, field officers have already noticed less traffic at this water source. Eventually the source will need to be restored or closed altogether, since it is dangerous to infants, as well as pregnant and nursing women.

What are the policy implications?

For households:

- All household members need to follow basic hygiene rules when collecting, transporting, storing, and using water.

For managers of water sources (e.g. standpipes and boreholes):

- Sanitize the space around water sources by installing sufficient water quality protection;
- Use appropriate lifting devices/materials and disinfect them regularly; and
- Train water source operators on hygiene practices.

For communities:

- Local authorities need to include the research findings in the Communal Development Plan for Potable Water Supply and Sanitation;
- The municipal council needs to promote new water purification and conservation activities; and

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Water tests indicate that 4-8 households out of 10 in the study sites have household water supply that is polluted with coliforms

- Local associations, NGOs, and those with influence need to convince and educate the public to change their water hygiene behaviour.

For governments:

- The ONEA needs to strengthen hygiene rules and ensure they are enforced, as stipulated in agreements with water source operators in outlying settlements;
- Municipal public health authorities need to review agreements relating to the construction of potable water supply infrastructure; and
- Municipal authorities need to strengthen standpipe and borehole managers' sanitation and water hygiene practices.

What next?

- Further research is needed, in collaboration with health services, on the impact of water quality on morbidity due to non-diarrheal disease, so as to better quantify the impact of water quality on health in informal settlements.
- Assessments are needed on the economic impacts of water access issues, as well as water-related morbidity in households, to improve water access in informal settlements. This research indicates that water shortage and/or water collection can have consequences not only on public health, but also on the economic situation of many poor households in informal settlements.
- Further research is needed on how households perceive water pollution and to assess their receptiveness to simple decontamination measures. This will help to inform educational campaigns aimed at improving water quality in informal settlements.

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Household water storage containers are often not sealed, leaving them exposed to contaminants

Need more information?

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References

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IDRC | CRDI
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